J. Lu

PhD Candidate

lu@di.ku.dk | (+1) 438-519-3698 | Montréal, Canada | ludles | ludles.github.io

PROJECT EXPERIENCE

Self-Explanatory Multi-Variate Time Series Anomaly Detection

Independent Researcher

Apr 2023 – Oct 2023 | McGill University, iSMART Lab

- Focusing on incorporating self-explanatory principles into the field of multi-variate time series anomaly detection
- Collaborating closely with researchers at the iSMART Lab to leverage their expertise in time series analysis, creating innovative solutions
- Exploring collaborations to develop cutting-edge, explainable anomaly detection models with real-world applications

Exploring Language-Motion Integration for Motion Editing

Project Leader & Supervisor of MSc Thesis

Oct 2022 – Jun 2023 | University of Copenhagen

- Led and supervised an MSc Thesis project of efficient motion editing using multimodal generative AI and Large Language Models (LLM)
- Guided the investigation of self-supervised 3D motion generation and editing techniques, including latent space exploration and instruction-based editing
- Inspired the students to employ a Prompt-to-Prompt approach to manipulate attention maps during the diffusion process, maintaining motion similarity while enabling efficient motion editing without retraining or additional data
- Coordinated and led discussions and facilitated interactions among the research team, industrial partners, and professors, resulting in the highest grade (12/12) in their thesis

Exploring Explainable AI for Chest X-Ray Interpretation

Co-supervisor of MSc Thesis

Jan 2023 – Sep 2023 | University of Copenhagen

- Collaborated closely with professors and radiologists on the crucial intersection of medical imaging and Explainable AI
- Guided the implementation of a comprehensive XAI pipeline, incorporating visual, example-based, and textual explanations
- Facilitated discussions between the research team, radiologists, and professors, fostering effective communication and collaboration
- Received the highest grade (12/12) for the project, contributing insights into XAI's potential in medical imaging

Data-/Annotation-Efficient Self-Explanatory Lung Nodule Diagnosis

Independent Researcher

Jul 2021 – Oct 2022 | University of Copenhagen

- Introduced self-supervised contrastive learning to significantly reduce annotation requirements, enabling competitive malignancy prediction with only 1% of annotations
- Extended the capabilities of the proposed method by conducting semi-supervised active learning in the learned space, achieving even more robust and accurate diagnosis with 10x fewer annotations
- Demonstrated effective collaboration and communication skills while working closely with radiologists to incorporate their clinical expertise into the development process

EDUCATION

Graduate Research Trainee

McGill University, Canada

Apr 2023 – Apr 2024

Dept of Electrical and Computer Engineering

PhD in Computer Science

University of Copenhagen, Denmark

Apr 2021 – Apr 2024

Dept of Computer Science

MSc in Computational Science

Uppsala University, Sweden

Sep 2018 – Nov 2020

Dept of Information Technology

- Anders Wall Scholarship
- 100% tuition fee waived
- GPA: 4.8/5.0

PhD Student in Medical Imaging

Peking University, China

Sep 2017 – Jul 2018

Dept of Biomedical Engineering

- National Doctoral Examination exempt direct admission
- Uncompleted (voluntary withdrawal)

Exchange Student in Physics

Uppsala University, Sweden

Aug 2015 – Jan 2016

Dept of Physics and Astronomy

- GPA: 4.8/5.0

BSc in Applied Physics

Beihang University, China

Sep 2013 – Jun 2017

School of Physics

- Admitted at the top 0.2% in the National College Entrance Examination
- Major GPA: 3.9/4.0

Multimodal Biomedical Image Registration

MSc Thesis at MIDA Group

Sep 2019 – Oct 2020 | Uppsala University

- Investigated the use of modern Image-to-Image (I2I) translation methods for multimodal image registration
- Implemented and evaluated four GAN-based I2I translation methods and a contrastive representation learning method on diverse multimodal datasets
- Published findings in a journal article, highlighting the strengths and limitations of I2I translation for multimodal image registration

Efficient Oral Cancer Screening on Whole Slide Images

Research Project at MIDA Group

Mar 2019 – Oct 2019 | Uppsala University

- Developed and implemented independently a fully automated end-to-end deep learning pipeline, reducing human bias and workload while enhancing classification reliability
- Proposed the per-cell focus selection module that improves accuracy of EMBM from 0.48 to 0.84 (comparable to human expert performance), with an impressive 8,491x speedup at 0.80 accuracy

Applet for University Autonomous Admission Simulation

Algorithm Engineer & Product Manager

Jul 2018 – Aug 2018 | Qingliu EdTech Group

- Designed independently the core algorithm based on Desicion Tree for the recommendation and probability computing
- Conducted comprehensive product and market research, along with requirements analysis, resulting in the development of a highly competitive product
- Collaborated effectively with front-end programmers and data engineers to bring the product to fruition

SELECTED PUBLICATIONS

Full list at: `ludles.github.io/publications`.

- **J. Lu**, C. Yin, K. Erleben, M. B. Nielsen, and S. Darkner. "cRedAnno+: Annotation Exploitation in Self-Explanatory Lung Nodule Diagnosis," *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2023. DOI: 10.1109/ISBI53787.2023.10230720.
- **J. Lu**, C. Yin, O. Krause, K. Erleben, M. B. Nielsen, and S. Darkner. "Reducing Annotation Need in Self-Explanatory Models for Lung Nodule Diagnosis," *Workshop on Interpretability of Machine Intelligence in Medical Image Computing (iMIMIC) at MICCAI*, 2022. DOI: https://doi.org/10.1007/978-3-031-17976-1_4.
- **J. Lu**, J. Öfverstedt, J. Lindblad, and N. Sladoje. "Is Image-to-Image Translation the Panacea for Multimodal Image Registration? A Comparative Study," *PLOS ONE*, 2022. DOI: 10.1371/journal.pone.0276196.
- **J. Lu**, N. Sladoje, C. R. Stark, E. D. Ramqvist, J. M. Hirsch, and J. Lindblad. "A Deep Learning based Pipeline for Efficient Oral Cancer Screening on Whole Slide Images," *International Conference on Image Analysis and Recognition (ICIAR)*, 2020. DOI: 10.1007/978-3-030-50516-5_22.
- N. Pielawski, E. Wetzer, J. Öfverstedt, **J. Lu**, C. Wählby, J. Lindblad, N. Sladoje. "CoMIR: Contrastive Multimodal Image Representation for Registration", *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. Preprint at arXiv:2006.06325.

SKILLS

- **Deep learning**
  PyTorch | TensorFlow | Keras
- **Programming**
  Python | C | MATLAB | Shell
- **High performance computing**
  POSIX Threads | MPI | OpenMP
- **Academic skills and professional tools**
  Linux | LaTeX | Zotero | EndNote | Markdown | ImageJ | SolidWorks | ParaView | GATE | ROOT
- **Data engineering**
  SQL | Spark | Hive | Hadoop

LANGUAGES

English ●●●●●

French ●●●○○

Chinese ●●●●●

TEACHING

Signal and Image Processing

Teaching Assistant

Spring 2023

University of Copenhagen, Denmark

Advanced Topics in Image Analysis

Project Supervisor

Autumn 2022

University of Copenhagen, Denmark

Signal and Image Processing

Teaching Assistant

Spring 2022

University of Copenhagen, Denmark

Database Design

Teaching Assistant

Autumn 2019

Uppsala University, Sweden